Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2018-35
Project Title:	Developing a multiplex PCR assay for rapid and quantitative differentiation between *E. coli* and cryptic *Escherichia* in the aquatic environments
Applicant:	Professor Lau Chun Kwan, Stanley, Department of Ocean Science, The Hong Kong University of Science and Technology
Total Approved Grant:	$495,000
Duration:	1/7/2019 to 31/12/2020
Project Status/Remarks:	Completed
Project Scope:	Currently, *E. coli* and cryptic *Escherichia* can only be differentiated through the costly and time-consuming multi-locus sequence typing method or a cumbersome five-reaction PCR assay. Neither of these methods is time- and cost-effective enough for routine water quality monitoring. The purpose of this proposed project is to develop a multiplex PCR assay, in both colony and quantitative PCR formats, for rapid and quantitative differentiation between cryptic *Escherichia* and *E. coli* in marine and freshwater samples.
Summary of the Findings/Outcomes:	Fecal pollution of water resources is a major cause of waterborne diseases and habitat deterioration. For decades, the fecal bacterium E. coli has been used as the principal indicator of pollution in water quality monitoring programs in Hong Kong and other places in the world. The membrane filtration method typically used for the determination of E. coli concentration in water samples is straightforward and incurs low capital and operational costs. However, the method can be confounded by the presence of cryptic Escherichia in water samples. Cryptic Escherichia is closely related to E coli, but it is ubiquitously present in the environment without association with fecal pollution. Therefore, the false detection of cryptic Escherichia as E. coli may cause inconvenience to the public and increase government expenditure unnecessarily in trying to trace and mitigate a pollution source that may not even exist. In this project, a multiplex PCR assay was developed for fast and accurate differentiation between cryptic Escherichia and E. coli in water samples. The multiplex PCR assay was made available in two different formats, namely colony PCR and quantitative PCR that work efficiently in tandem with the membrane filtration method for more accurate monitoring of water quality.